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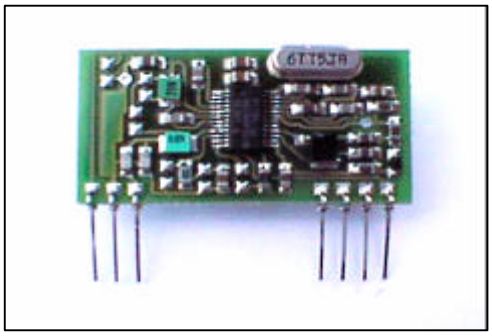
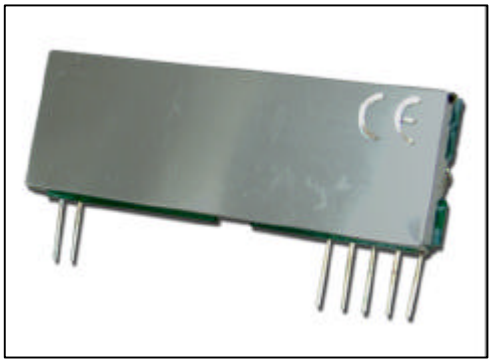
QM Receiver Module QMR1 / QMR2

Features

- Miniature SIL Package
- Unique QM (Quasi AM/FM) Design
- Data Rates Up To 10kbits/s
- Optimal Range 200m (433.92MHz Versions)
- 433.92 / 868 MHz Versions
- Very High Sensitivity (-112 dBm)
- Very Low Current Consumption
- Single 5v Supply
- Signal Strength Output (RSSI)
- High Selectivity (20KHz B/W Possible on QMR1)
- Immune To FM Threshold Effect





Applications

- Vehicle Alarm Systems
- Remote Gate Controls
- Garage Door Openers
- Domestic And Commercial Security

Compatible Transmitter Modules

- QFMT1-XXX (see data sheet DS301)
- QAMT2-XXX (see data sheet QAMT2)

General Description

These miniature UHF receiver radio modules enable the implementation of a simple telemetry link at data rates of up to 10Kbit/s when used with one of the compatible transmitter modules

Available for operation at 433.92 and 868 MHz these modules are able to receive at distances of up to 200Mtrs.

The QMR1 / QMR2 modules will suit one-to-one and multi-node wireless links in applications including building and car security, remote industrial process monitoring and computer networking. Because of its small size and low power requirements, the module is ideal for use in portable battery powered wireless applications

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Absolute Maximum Ratings: Receiver

Operating temperature:	-10°C to +55°C
Storage temperature:	-40°C to +100°C
Supply Voltage	5V
Data input	10V
RF Input	±50V @ < 10MHz , +20dBm @ > 10MHz

Electrical Characteristics: Receiver

	pin	min.	typ.	Max.	Units	Notes
DC LEVELS						
Supply voltage		4.5	5	5.5	V	
Supply current			2 4.8		mA mA	QMR1 QMR2
Supply ripple		-	-	10	mV_{P-P}	
Data output high			4.0		V	
Data output low				0.5	V	
RF						
RF sensitivity			-110 -112		dBm dBm	QMR1 QMR2
IF Bandwidth			600 230		KHz KHz	QMR1 QMR2
Initial frequency accuracy			±50 +/-30		KHz KHz	QMR1 QMR2
Max R.F. input			20 20		dBm dBm	QMR1 QMR2
E.M.C.						
Spurious responses upto 1GHz			<60		dB	
LO leakage, conducted			<60		dBm	
LO leakage, radiated			<60		dBm	
DYNAMIC TIMING						
Power up with signal present						
Power up to stable data			10		mS	
Signal applied with supply on						
Signal to stable data			6		mS	
Time between data transitions			10		mS	
Mark:space ratio			50		%	
Bit rate		20 200		10000 4000	bps bps	QMR1 QMR2

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QMR1 Details

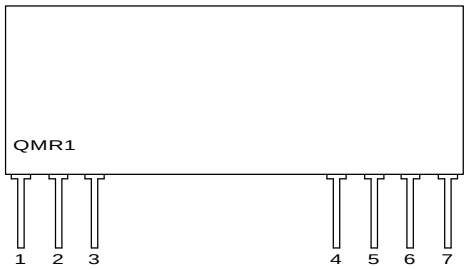

Figure 1: QMR1 Receiver

Pin Description:

Vcc (PIN 1)
+Ve supply pin. Operation from a 5V supply able to source 2mA at less than 10mV$_{P-P}$ ripple.

GND (PIN 2)
Supply ground connection, preferably connected to a solid ground plane.

RF IN (PIN 3)
50Ω RF input from antenna, connect using shortest possible route. Capacitively isolated from internal circuit.

UNCONNECTED (PINS 4 & 5)
Extra SIL pins for additional mechanical retention.

RSSI (PIN 6)
Test output providing a voltage that is proportional to the level of the RF input on pin 3.

DATA OUT (PIN 7)
CMOS compatible output. This may be used to drive external decoders. **Note:** sink/source capability is limited to 20µA.

General Information

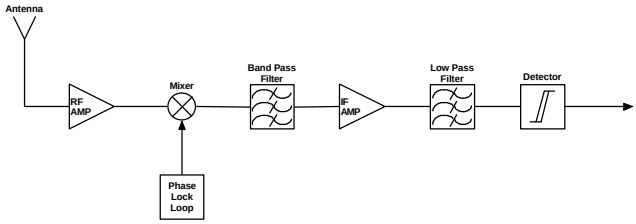

Figure 2: Receiver Block Diagram

The receiver module is a quasi AM /FM (QM) superhet receiver capable of handling data rates of up to 10Kbits/s. With an on board data buffer and phase locked loop a –110 dBm sensitivity is achieved.

Utilising the quasi AM/FM modulation technique and the latest phase locked loop receiver technology with one of the compatible transmitter modules will yield a highly efficient wireless link.

Note: Because of the way Quasi Modulation operates the QMR1 and the QFMT1 will not work reliably in close proximity to each other.

RSSI Values

RF Level (dBm) pin 3	RSSI (volts) pin 6
-110	2.12
-100	2.21
-90	2.31
-80	2.46
-70	2.62
-60	2.80
-50	2.91
-40	2.97
-30	3.00
-20	3.03
-10	2.88

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QMR2 Details

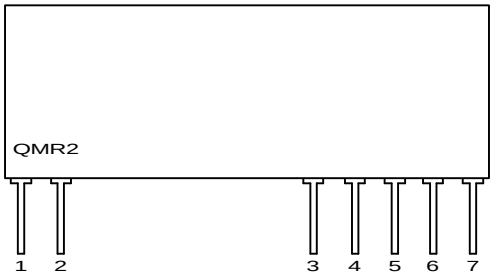

Figure 3 QMR2 Receiver

Pin Description:

RF IN (pin 1)
50 ohm RF input from antenna, connect using shortest possible route. This input is isolated from the internal circuit using the air gap of the front end SAW RF filter.

RF GND (pin 2)
Supply ground connection. Preferably connected to a solid ground plane.

RSSI (pin 3)
This is a dc output voltage that is proportional to the RF signal strength applied to pin 1.

GND (pin 4)
Connected to power supply ground.

Vcc (pin 5)
+Ve supply pin. Operation from a 5V supply able to source 6mA at less than Vp-p ripple.

AF (pin 6)
Audio frequency output. Note Source current is limited to 40 microA. In most applications a buffer may be required to interface to this pin.

DATA OUT (pin 7)
CMOS compatible output. This may be used to drive external decoders.

General Information

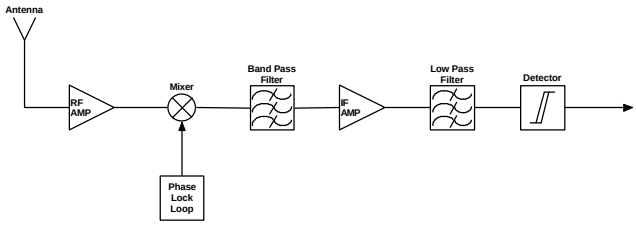

Figure 4: Receiver Block Diagram

The QMR2 receiver module is a FM single conversion superhet receiver capable of handling data rates of up to 10Kbits/s. With an on board data buffer, phase locked loop and a high quality front end RF stage, a –107dBm sensitivity is achieved.

Utilising the latest phase locked loop receiver technology with one of the compatible transmitter modules will yield a highly efficient wireless link.

RSSI Values

RF Level (dBm) pin 3	RSSI (volts) pin 6
-110	1.16
-100	1.34
-90	1.59
-80	1.78
-70	1.81
-60	1.81
-50	2.17
-40	2.45
-30	2.52
-20	2.52
-10	2.52

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Application Information

Antenna Design

The design and positioning of the antenna is as crucial as the module performance itself in achieving a good wireless system range. The following will assist the designer in maximising system performance.

The antenna should be kept as far away from sources of electrical interference as physically possible. If necessary, additional power line decoupling capacitors should be placed close to the module.

The antenna 'hot end' should be kept clear of any objects, especially any metal as this can severely restrict the efficiency of the antenna to receive power. Any earth planes restricting the radiation path to the antenna will also have the same effect.

Best range is achieved with either a straight piece of wire, rod or PCB track @ ¼ wavelength (15.5cm @ 433.92MHz). Further range may be achieved if the ¼ wave antenna is placed perpendicular in the middle of a solid earth plane measuring at least 16cm radius. In this case, the antenna should be connected to the module via some 50 ohm characteristic impedance coax

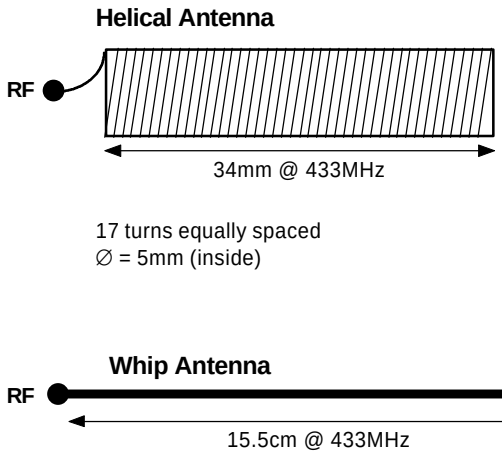

Figure 5: Antenna Configurations To Be Used With The Modules

Receiver Data Output Buffer

The QMR1 receiver has a push-pull data output drive limited to 20uA. If drive problems are experienced, and sometimes they exhibit themselves in a poor system range, the following simple buffer stage should be incorporated between the module data output and the subsequent stage. This buffer is already present on the QMR2 receiver.

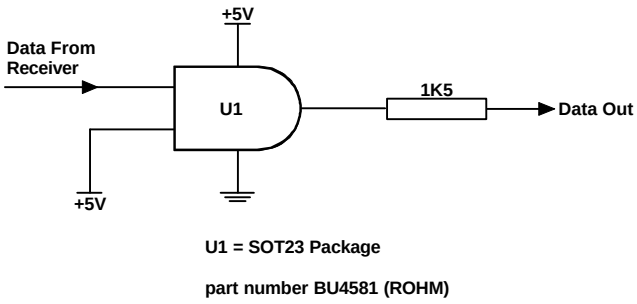

Figure 6: Receiver Data Output Buffer

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Application Circuit

The application circuit shows how the QM receiver can easily be integrated into a system to form a wireless link.

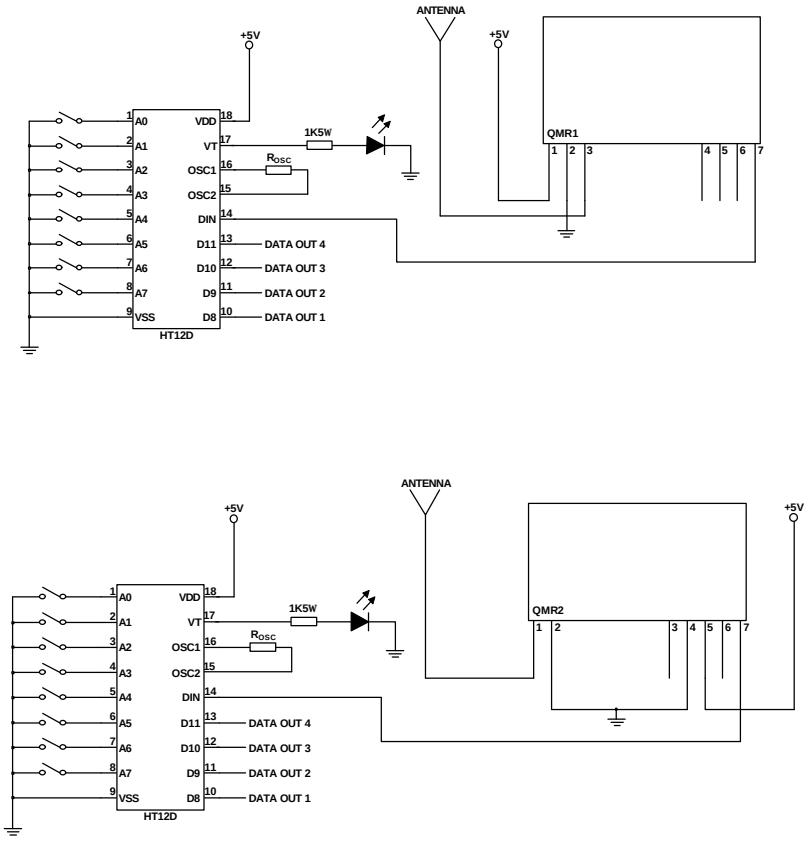

Figure 7: QM Receiver Application Circuits

Mechanical Dimensions

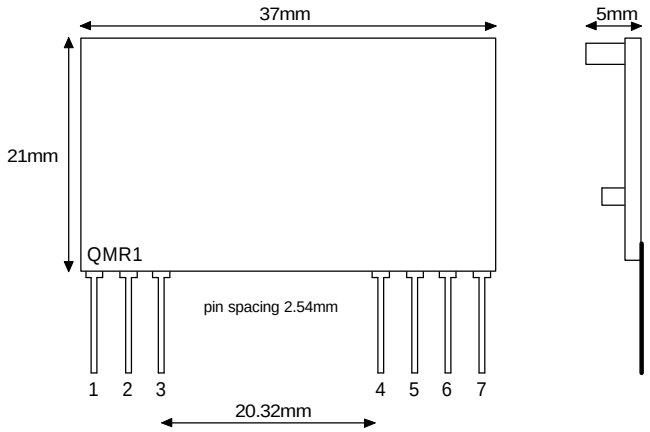

Figure 8: QMR1 Receiver

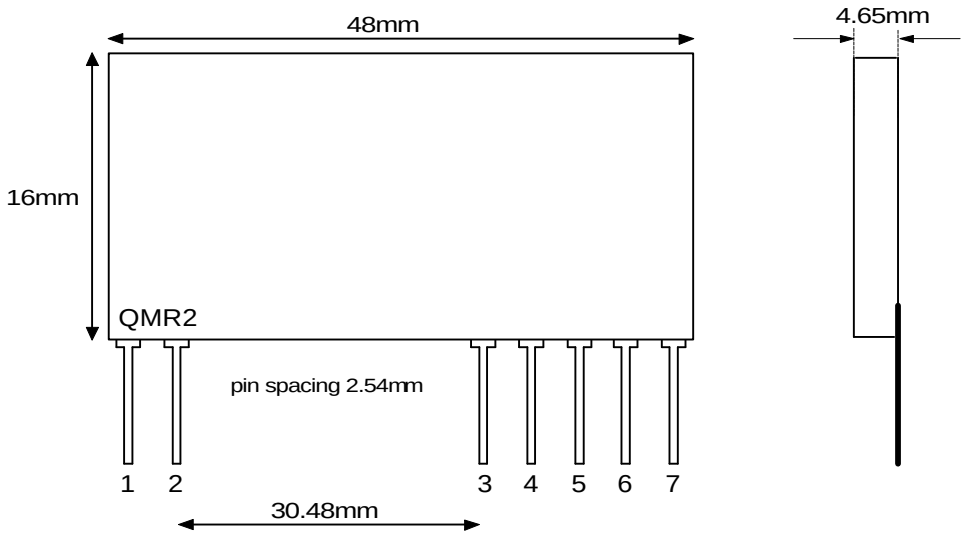

Figure 9: QMR2 Receiver

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Ordering Information

PART No	Description
QMR1-434	SIL Receiver 434 MHz
QMR1-868	SIL Receiver 868 MHz
QMR2-434	SIL Receiver 434 MHz

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